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BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			HO, ALLEN C	
			ART UNIT	PAPER NUMBER
			2882	

DATE MAILED: 12/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

DETAILED ACTION

Election/Restrictions

1. Claims 12-17 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 15 November 2006.

Claim Objections

2. Claims 2-5 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claims 2-5 recite "said first diameter is in said first section", which is broader than the limitation "a first diameter at a position where a first of said plurality of insulating layers contacts said plurality of first electrodes" recited in claim 1.

3. Claims 12-17 are objected to because of the following informalities:

The status identifier of claims 12-17 should be updated.

Appropriate correction is required.

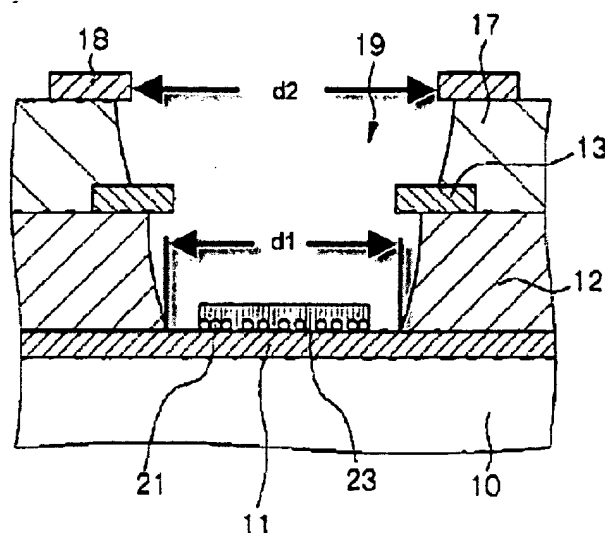
Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 5-9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Muroyama *et al.* (U. S. Pub. No. 2002/0036452 A1) in view of Kawate *et al.* (U. S. Patent No. 7,012,362 B2).

With regard to claim 1, Muroyama *et al.* disclosed a cold cathode light emitting device that comprises: a plurality of first electrodes (11); a plurality of insulating layers (12, 17) laminated over the plurality of first electrodes (Fig. 16); a plurality of second electrodes (18) provided on the plurality of insulating layers to intersect the plurality of first electrodes with the plurality of insulating layers interposed therebetween for extracting electrons from the plurality of first electrodes; a third electrode (33) opposed to the plurality of second electrodes for emitting light upon receipt of the electrons, with a voltage for accelerating the electrons being applied between the third electrode and the plurality of first electrodes; at least one hole (19) provided at each intersection of the plurality of first electrodes and the plurality of second electrodes extending through the plurality of second electrodes and the plurality of insulating layers to reach a surface of the plurality of first electrodes, the at least one hole having a first diameter (d_1) at a position where a first of the plurality of insulating layers contact the plurality of first electrodes and a second diameter (d_2) at a position of the plurality of second electrodes, where the second diameter is greater than the first diameter (see figure below).



However, Muroyama *et al.* failed to disclose a nanofiber-structure layer provided on the plurality of first electrodes in an opening portion corresponding to the first diameter in the at least one hole.

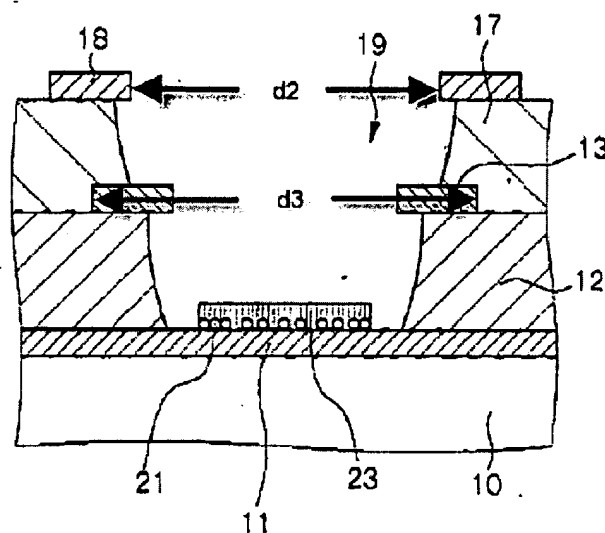
Kawate *et al.* disclosed a cold cathode light emitting device that comprises a nanofiber-structure layer provided on the plurality of first electrodes. Kawate *et al.* taught that nanofiber is capable of emitting a high electron current at a low electric field (column 11, lines 32-57).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a nanofiber-structure layer on the plurality of first electrodes in an opening portion corresponding to the first diameter in the at least one hole, since a person would be motivated to employ an electron emission material that is capable of emitting a high electron current at a low electric field.

With regard to claim 2, Muroyama *et al.* and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein the at least one hole is divided into a first section corresponding to a lowermost insulating layer (Muroyama *et al.* 12) of the plurality of

Art Unit: 2882

insulating layers being in contact with the plurality of first electrodes, a second section corresponding to the remainder (Muroyama *et al.* 17) of the plurality of insulating layers located over the lowermost insulating layer, and a third section corresponding to the plurality of second electrodes (18); and the first diameter (d_1) is in the first section, the second diameter (d_2) is in the third section, and a third diameter (d_3) is at a lower part of the second section, where the third diameter is greater than the second diameter (see figure below).



With regard to claim 5, Muroyama *et al.* and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein the at least one hole is divided into a first section corresponding to a lowermost insulating layer (Muroyama *et al.* 12) of the plurality of insulating layers being in contact with the plurality of first electrodes, a second section corresponding to the remainder (Muroyama *et al.* 17) of the plurality of insulating layers located over the lowermost insulating layer, and a third section corresponding to the plurality of second electrodes (Muroyama *et al.* 18); and the first diameter (d_1) is in the first section, and the second

section includes a diameter that increases to flare toward the plurality of second electrodes (Muroyama *et al.*, Fig. 16).

With regard to claim 6, Muroyama *et al.* and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein an insulating layer (Muroyama *et al.* 17) of the plurality of insulating layers located over a lowermost insulating layer (Muroyama *et al.* 12) of the plurality of insulating layers being in contact with the plurality of first electrodes has the same pattern configuration (holes overlap) as the plurality of second electrodes.

With regard to claim 7, Muroyama *et al.* and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Muroyama *et al.* 12) of the plurality of insulating layers being in contact with the plurality of first electrodes is a deposited insulating layer in which insulative films are deposited. Note: This claim is treated as a product-by-process claim. MPEP § 2113.

With regard to claim 8, Muroyama *et al.* and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Muroyama *et al.* 12) of the plurality of insulating layers being in contact with the plurality of first electrodes is formed by firing a paste material made of resin containing glass powder dispersed therein. Note: This claim is treated as a product-by-process claim. MPEP § 2113.

With regard to claim 9, Muroyama *et al.* and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Muroyama *et al.* 12) being in contact with the plurality of first electrodes (Muroyama *et al.* 11) has a thickness t_1 (Muroyama *et al.*, paragraph [0172]), and the remainder (Muroyama *et al.* 17) of the plurality of insulating layers other than the lowermost insulating layer has a thickness t_2 .

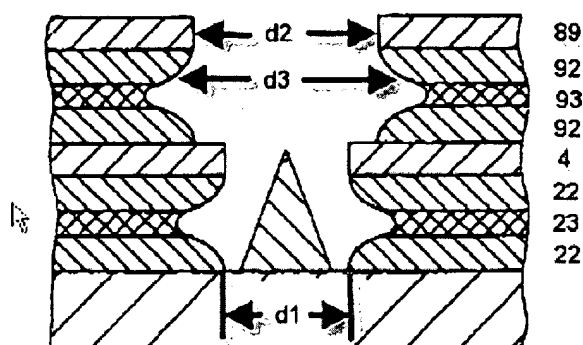
However, Muroyama *et al.* and Kawate *et al.* failed to disclose t_2 .

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a remainder with a thickness t_2 that is greater than t_1 , since a person would be motivated to adjust the separations between the electrodes.

With regard to claim 11, Muroyama *et al.* and Kawate *et al.* disclosed an image display comprising a display provided with the cold cathode light emitting device as recited in claim 1 (Muroyama *et al.*, paragraph [0002]).

6. Claims 1-3, 5-9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seko *et al.* (U. S. Patent No. 6,075,315) in view of Trujillo *et al.* (U. S. Patent No. 5,929,560) and Kawate *et al.* (U. S. Patent No. 7,012,362 B2).

With regard to claim 1, Seko *et al.* disclosed a cold cathode light emitting device that comprises: a substrate (71); a plurality of emitter electrodes (5); a plurality of insulating layers (22, 23, 92, 93) laminated over the substrate (Figs. 17-19); a plurality of second electrodes (89) provided on the plurality of insulating layers; a third electrode (120, 121) opposed to the plurality of second electrodes for emitting light upon receipt of the electrons, with a voltage for accelerating the electrons being applied between the third electrode and the plurality of first electrodes; at least one hole extending through the plurality of second electrodes and the plurality of insulating layers to reach a surface of the substrate, the at least one hole having a first diameter (d_1) at a position where a first (22) of the plurality of insulating layers contact the substrate and a second diameter (d_2) at a position of the plurality of second electrodes, where the second diameter is greater than the first diameter (after side wall 80 is removed; column 14, lines 26-35).



However, Seko *et al.* failed to disclose: a plurality of first electrodes; and a nanofiber-structure layer provided on the plurality of first electrodes.

Trujillo *et al.* disclosed a cold cathode light emitting device that comprises a substrate (124), a plurality of emitter electrodes (136), and a plurality of a plurality of conductive electrodes (126, 128, 130) disposed on the substrate. The plurality of conductive electrodes connect the plurality of emitter electrodes to respective power sources (173).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a plurality of first electrodes on the substrate, since a person would be motivated to connect the plurality of emitter electrodes to their respective power sources.

Kawate *et al.* disclosed a cold cathode light emitting device that comprises a nanofiber-structure layer provided on the plurality of first electrodes. Kawate *et al.* taught that nanofiber is capable of emitting a high electron current at a low electric field (column 11, lines 32-57).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a nanofiber-structure layer on the plurality of first electrodes in an opening portion corresponding to the first diameter in the at least one hole, since a person

Art Unit: 2882

would be motivated to employ an electron emission material that is capable of emitting a high electron current at a low electric field.

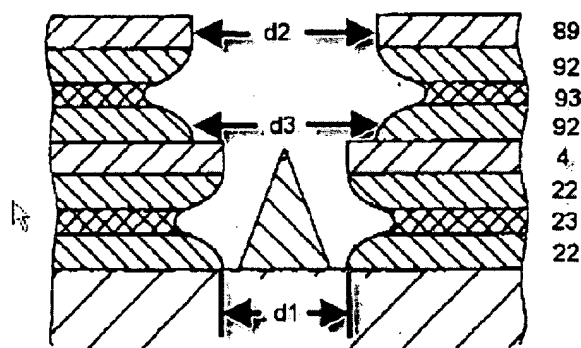
With regard to claim 2, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein the at least one hole is divided into a first section corresponding to a lowermost insulating layer (Seko *et al.* 22) of the plurality of insulating layers being in contact with the plurality of first electrodes, a second section corresponding to the remainder (Seko *et al.* 23-92) of the plurality of insulating layers located over the lowermost insulating layer, and a third section corresponding to the plurality of second electrodes (Seko *et al.* 89); and the first diameter (d_1) is in the first section, the second diameter (d_2) is in the third section, and a third diameter (d_3) is at a lower part (Seko *et al.* 93) of the second section, where the third diameter is greater than the second diameter (see figure below).

With regard to claim 3, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein the at least one hole is divided into a first section corresponding to a lowermost insulating layer (Seko *et al.*, 22) of the plurality of insulating layers being in contact with the plurality of first electrodes, a second section corresponding to the remainder (Seko *et al.* 23-92) of the plurality of insulating layers located over the lowermost insulating layer, and a third section corresponding to the plurality of second electrodes (Seko *et al.* 89); and the first diameter (d_1) is in the first section, and the second section includes a diameter (d_3) which decreases to taper toward the plurality of second electrodes (See figure above).

With regard to claim 5, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein the at least one hole is divided into a

Art Unit: 2882

first section corresponding to a lowermost insulating layer (Seko *et al.* 22) of the plurality of insulating layers being in contact with the plurality of first electrodes, a second section corresponding to the remainder (Seko *et al.* 23-92) of the plurality of insulating layers located over the lowermost insulating layer, and a third section corresponding to the plurality of second electrodes (Seko *et al.* 89); and the first diameter (d_1) is in the first section, and the second section includes a diameter (d_3) that increases to flare toward the plurality of second electrodes (See figure below).



With regard to claim 6, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein an insulating layer of the plurality of insulating layers located over a lowermost insulating layer (Seko *et al.* 22) of the plurality of insulating layers being in contact with the plurality of first electrodes has the same pattern configuration (holes overlap) as the plurality of second electrodes.

With regard to claim 7, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Seko *et al.* 22) of the plurality of insulating layers being in contact with the plurality of first electrodes is

Art Unit: 2882

a deposited insulating layer in which insulative films are deposited. Note: This claim is treated as a product-by-process claim. MPEP § 2113.

With regard to claim 8, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Seko *et al.* 22) of the plurality of insulating layers being in contact with the plurality of first electrodes is formed by firing a paste material made of resin containing glass powder dispersed therein. Note: This claim is treated as a product-by-process claim. MPEP § 2113.

With regard to claim 9, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Seko *et al.* 22) being in contact with the plurality of first electrodes has a thickness t_1 , and the remainder of the plurality of insulating layers other than the lowermost insulating layer has a thickness t_2 .

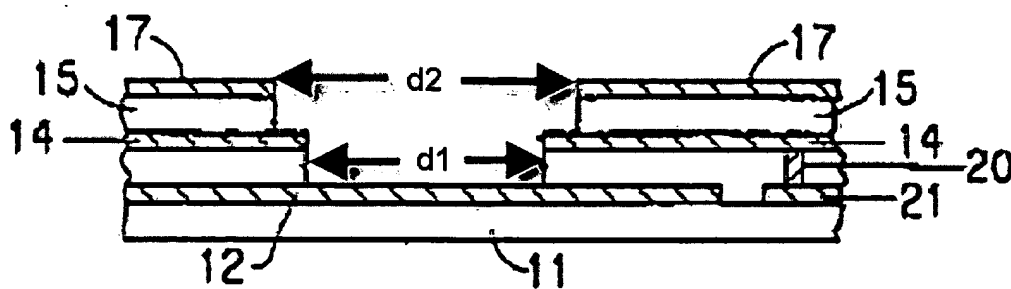
However, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* failed to disclose a $t_2 < t_1$.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a remainder with a thickness t_2 that is greater than t_1 , since a person would be motivated to adjust the separations between the electrodes.

With regard to claim 11, Seko *et al.*, Trujillo *et al.*, and Kawate *et al.* disclosed an image display comprising a display provided with the cold cathode light emitting device as recited in claim 1 (Seko *et al.*, column 5, lines 58-62).

7. Claims 1, 4, 6-9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amey, Jr. (U. S. Patent No. 7,101,243 B2) in view of Raina *et al.* (U. S. Patent No. 6,211,608 B1).

With regard to claim 1, Amey, Jr. *et al.* disclosed a cold cathode light emitting device that comprises: a plurality of first electrodes (12; column 5, lines 47-58); a plurality of insulating layers (13, 15) laminated over the plurality of first electrodes (Fig. 3a); a second electrode (17) provided on the plurality of insulating layers to intersect the plurality of first electrodes with the plurality of insulating layers interposed therebetween for extracting electrons from the plurality of first electrodes; at least one hole provided at each intersection of the plurality of first electrodes and the plurality of second electrodes extending through the plurality of second electrodes and the plurality of insulating layers to reach a surface of the plurality of first electrodes, the at least one hole having a first diameter (d_1) at a position where a first of the plurality of insulating layers contact the plurality of first electrodes and a second diameter (d_2) at a position of the plurality of second electrodes, where the second diameter is greater than the first diameter (see figure below); and a nanofiber-structure layer provided on the plurality of first electrodes in an opening portion corresponding to the first diameter in the at least one hole (column 4, lines 8-20).



However, Amey, Jr. failed to disclose a plurality of second electrode provided on the plurality of insulating layers to intersect the plurality of first electrodes with the plurality of insulating layers interposed therebetween for extracting electrons from the plurality of first

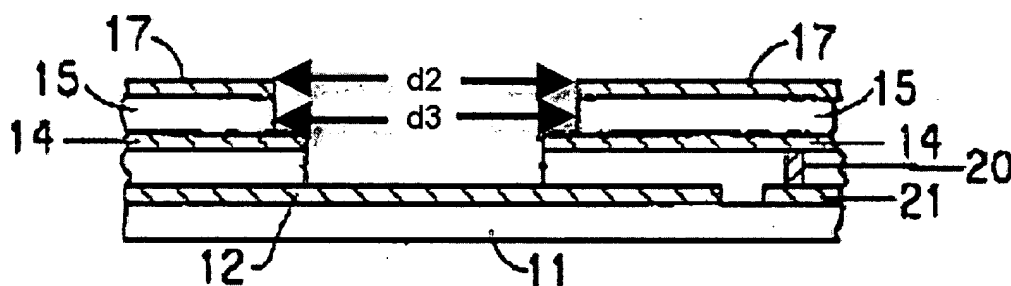
electrodes, and a third electrode opposed to the plurality of second electrodes for emitting light upon receipt of the electrons, with a voltage for accelerating the electrons being applied between the third electrode and the plurality of first electrodes.

Raina *et al.* disclosed a cold cathode light emitting device that comprises: a plurality of second electrode (74) provided on the plurality of insulating layers (60, 66) to intersect the plurality of first electrodes (56) with the plurality of insulating layers interposed therebetween for extracting electrons from the plurality of first electrodes; and a third electrode (90) opposed to the plurality of second electrodes for emitting light upon receipt of the electrons, with a voltage for accelerating the electrons being applied between the third electrode and the plurality of first electrodes. Raina *et al.* taught that such an arrangement provides an individually addressable array of grid-controlled emitter sets (column 2, lines 50-51).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a plurality of second electrode provided on the plurality of insulating layers to intersect the plurality of first electrodes with the plurality of insulating layers interposed therebetween for extracting electrons from the plurality of first electrodes, since a person would be motivated to form an array of grid-controlled emitter sets that are individually addressable.

Furthermore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a third electrode opposed to the plurality of second electrodes for emitting light upon receipt of the electrons, since a person would be motivated to form an image plane.

With regard to claim 4, Amey, Jr. and Raina *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein the at least one hole is divided into a first section corresponding to a lowermost insulating layer (Amey, Jr. 13) of the plurality of insulating layers being in contact with the plurality of first electrodes, a second section corresponding to the remainder (Amey, Jr. 15) of the plurality of insulating layers located over the lowermost insulating layer, and a third section corresponding to the plurality of second electrodes (Amey, Jr. 17); and the first diameter is in the first section, and the second section includes a constant diameter (d_3) substantially equal to the second diameter throughout the second region (see figure below).



With regard to claim 6, Amey, Jr. and Raina *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein an insulating layer (Amey, Jr. 15) of the plurality of insulating layers located over a lowermost insulating layer (Amey, Jr. 13) of the plurality of insulating layers being in contact with the plurality of first electrodes has the same pattern configuration (holes overlap) as the plurality of second electrodes (Amey, Jr., Fig. 3a).

With regard to claim 7, Amey, Jr. and Raina *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Amey, Jr. 13) of the plurality of insulating layers being in contact with the plurality of first electrodes is a deposited

Art Unit: 2882

insulating layer in which insulative films are deposited. Note: This claim is treated as a product-by-process claim. MPEP § 2113.

With regard to claim 8, Amey, Jr. and Raina *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Amey, Jr. 13) of the plurality of insulating layers being in contact with the plurality of first electrodes is formed by firing a paste material made of resin containing glass powder dispersed therein. Note: This claim is treated as a product-by-process claim. MPEP § 2113.

With regard to claim 9, Amey, Jr. and Raina *et al.* disclosed the cold cathode light emitting device according to claim 1, wherein a lowermost insulating layer (Amey, Jr. 13) being in contact with the plurality of first electrodes (Amey, Jr. 12) has a thickness t_1 , and the remainder (Amey, Jr. 15) of the plurality of insulating layers other than the lowermost insulating layer has a thickness t_2 .

However, although Amey, Jr. disclosed a thickness range of the insulating layers (column 3, lines 10-14), Amey, Jr. and Raina *et al.* failed to disclose $t_1 < t_2$.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a remainder with a thickness t_2 that is greater than t_1 , since a person would be motivated to adjust the separations between the electrodes.

With regard to claim 11, Amey, Jr. and Raina *et al.* disclosed an image display comprising a display provided with the cold cathode light emitting device as recited in claim 1 (Amey, Jr., column 1, lines 24-41).

Allowable Subject Matter

8. Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
9. Claim 18 is allowed.

Response to Arguments

10. Applicant's arguments filed 09 June 2006 with respect to the specification have been fully considered and are persuasive. The objection of the specification has been withdrawn.
11. Applicant's arguments filed 09 June 2006 with respect to claims 13 and 15 have been fully considered and are persuasive. The objections of claims 13 and 15 has been withdrawn.
12. Applicant's arguments filed 09 June 2006 with respect to the rejection(s) of claim(s) 1-9 and 11-17 under 35 U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Muroyama *et al.* (U. S. Pub. No. 2002/0036452 A1) and Amey, Jr. (U. S. Patent No. 7,101,243 B2).

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:
 - (1) Govyadinov *et al.* (U. S. Patent No. 6,835,947 B2) disclosed an emitter.

Art Unit: 2882

- (2) Ahmed *et al.* (U. S. Patent No. 6,771,012 B2) disclosed an apparatus for producing an electron beam.
- (3) Shaw *et al.* (U. S. Patent No. 6,686,680 B2) disclosed a second diameter that is greater than a first diameter (Fig. 4e).
- (4) Tomii (U. S. Patent No. 6,680,564 B2) disclosed a second diameter that is greater than a first diameter (Fig. 8).
- (5) Okita *et al.* (U. S. Patent No. 6,489,710 B1) disclosed a second diameter that is greater than a first diameter (Fig. 3A).

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2882

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Allen C. Ho, Ph.D.
Primary Examiner
Art Unit 2882

05 December 2006